

# Calculating Home Range and Density of Small Mammals

**T**WO interrelated aspects of animal population ecology are considered in this monograph. First, a mathematical formulation describes how individual animals use the space radiating from their homes. This space is designated as home range. Second, from this formulation, mathematical formulations are developed for estimating density by the use of capture data.

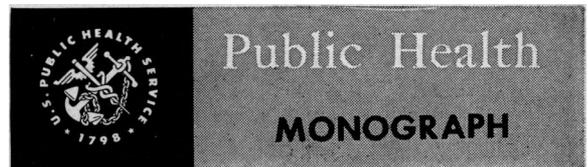
The probability of recording an animal per unit of area about its home or center of activity is adequately described by the bivariate normal distribution function. The farther a locality is from the center of an animal's activity, the less likelihood there is that the animal will be observed there.

In estimating density, it is customary to use some sampling device which has a discrete location in space. Obviously, some animals will live close to this device and others farther away. Where the use of space is describable by the bivariate normal distribution function, those animals living close to the sampling device will have a higher probability of being sampled than will those living farther away. With this insight into home range, it is possible to arrive at reliable estimates of density from a sequence of samples representing portions of the population removed.

Although the data in this monograph concern certain mice and other small mammals, application of the formulations presented can lead to much more precise information than is now available on the role of mammals in the epidemiology of diseases for which they serve as reservoir hosts.

The formulations concerning home range are of particular relevance in the study of animal behavior and population dynamics. They pro-

vide a basis for understanding the phenomenon of territoriality as well as a basis for measuring contact rate among members of an animal population.



## No. 55

The accompanying summary covers the principal findings presented in Public Health Monograph No. 55, published concurrently with this issue of Public Health Reports. The senior author is with the National Institute of Mental Health, National Institutes of Health, Public Health Service, Bethesda, Md.; the junior author is with the Eastern Pennsylvania Psychiatric Institute, Philadelphia, Pa.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Health Service. Copies will be found also in the libraries of professional schools and of the major universities and in selected public libraries.

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Calhoun, John B., and Casby, James U.: Calculation of home range and density of small mammals. Public Health Monograph No. 55 (PHSPub. No. 592). 24 pages. U. S. Government Printing Office, Washington, D. C., 1958. Price 25 cents.

# publications

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**Selected Materials on Staphylococcal Disease.** *PHS Publication No. 627; 1958; 237 pages; \$1.25.*

Selected reprints of articles from medical journals, information on teaching aids, list of additional readings, locations of phage typing centers, and recommendations of several professional associations are provided for instructors, physicians, nurses, and laboratory personnel.

This book may be used either as a refresher document or for orientation.

**Accidental Injury Statistics.** *PHS Publication (unnumbered); 1958; 61 pages.*

Salient facts about injuries and deaths from accidents in the United States are presented in a series of charts and tables prepared for health departments and agencies concerned with accident prevention.

The report is divided into sections dealing specifically with incidence of nonfatal injuries, leading causes of death, trends in accidental deaths over a 50-year period, types of accidents, relationship of accidents to marital status, and place of residence.

National Health Survey data collected in sample household interviews, figures provided by the National Office of Vital Statistics, and information contained in several selected studies of accidental injuries are included.

**Statistical Summary of Sewage Works in the United States.** *PHS Publication No. 609; 1958; by John R. Thoman and Kenneth H. Jenkins; 40 pages; 20 cents.*

Based on the 1957 Inventory of Municipal and Industrial Wastes Facilities, this report summarizes and analyzes data on community sewage disposal works in the United States.

Comprehensive data for all phases of sewage collection and treatment are tabulated according to States, population size groups, and major

drainage basins. Detailed analytical tables are given and comparisons are made with appropriate prior information.

This report provides the background information for use in conjunction with PHS Publication No. 619, Municipal Sewage Treatment Needs.

**Indians on Federal Reservations in the United States. A digest. Billings Area.** *PHS Publication No. 615, part 2; 1958; 17 pages.*

Brief information about each of the eight Federal Indian Reservations in Montana and Wyoming is contained in this digest.

The population groups, their homes, education, and income, and their health status and services are discussed. Included also is a description of the location, ownership, and topography of the reservation land.

**Physicians' Handbook on Death and Birth Registration.** *PHS Publication No. 593; 1958; 11th edition; 38 pages; 20 cents.*

A minor revision of a publication issued in 1949, this booklet contains facts which the practicing or prospective physician should know concerning birth, death, and fetal death registration requirements and procedures. Selected references are presented and vital statistics offices listed alphabetically by State or Territory.

**Using Your Community's Health Resources.** *Department of Agriculture Rural Research Leaflet No. 5; 1958.*

Steps aimed at improving use of available health services to meet rural community health problems are listed in this leaflet, prepared jointly by the Department of Agriculture and the Public Health Service. Suggestions include a study of the local situation, closer cooperation between local private and public groups, assessment of present health

facilities, and a communitywide campaign to promote better health.

Written in nontechnical language, the leaflet should be useful to public administrators, civic leaders, county agents, farm organizations, and clubs. Copies may be obtained from the Publications Office, Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D. C.

**Good Water Makes Good Neighbors.** *PHS Publication No. 626; 1958; 7 pages.*

This pamphlet was designed to alert women's clubs to the urgency of the Nation's water pollution problem. It provides a brief outline of the situation, suggestions for action by women's clubs, and discussion topics.

**Published Scientific Papers of the National Institutes of Health, 1957.** *PHS Publication No. 618 (Public Health Bibliography Series No. 23); 114 pages.*

Papers presenting original work of scientists at the National Institutes of Health, Public Health Service, published during 1957 are listed in this bibliography. Titles are arranged by institute, division, and laboratory to which the senior author was attached when the work was done.

An author index shows the extent of multidisciplinary approach to research problems and reflects the contribution of all authors as well as each unit.

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This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

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